

INSIGHTS

LETTERS

Evidence of climate change inspires some scientists to rely on bicycles instead of cars, like these cyclists in New Delhi, India.

INGENUITY: NEXTGEN'S VISION

Science-inspired sustainable behavior

We asked young scientists this question: **How has your awareness of science inspired you to adopt more sustainable and environmentally friendly behavior?** Respondents from around the world described scientific concepts, images, and research from a range of fields that inspire them to make environmentally friendly decisions and model sustainable behavior for others, in both their personal and professional lives. Read a selection of the best responses here. Follow NextGen on Twitter with hashtag #NextGenSci. See all NextGen Voices results at <https://science.sciencemag.org/collection/nextgen-voices>. —Jennifer Sills

Transportation decisions

I have witnessed climate change firsthand. The once seasonal river of my village has now turned completely dry. Agriculture is suffering due to decreased rainfall and extreme temperatures. After realizing the effects of our resource-intensive lifestyles, I have tried to conserve energy and water as much as possible. Public transport, cycling, and walking are my preferred modes of transportation. Even in the lab, I try to prevent the waste of electricity, water, paper, chemicals, and plastic. People taunt me for being a miser. However, once I explain my reasoning, they often support me, and many have started following the path of sustainable living.

Brijesh Kumar

Dr. Sneha Lata Singla-Pareek's Lab, Plant Stress Biology Lab, International Centre for Genetic Engineering and Biotechnology, New Delhi 110067, India. Email: brijeshkumar2412@outlook.com

There are more than 20,000 unique proteins in our body, but even a small change to one of them can be lethal. The environment, like our bodies, is a complex network of systems, and even seemingly small alterations can lead to drastic consequences. I take this message to heart by using public transportation instead of driving into work. It is challenging to schedule experiments within the transit schedule. However, through careful planning I'm still able to work effectively. Also, transit gives me a dedicated time to read literature, analyze data, and write responses to NextGen Voices surveys.

Mark Martin Jensen

Department of Biomedical Engineering,
University of Utah, Salt Lake City, UT 84112, USA.
Twitter: @mmjensen3

Aviation produces about 5% of worldwide CO₂ emissions. Scientists are expected to travel frequently, but forgoing one transcontinental flight per year would decrease carbon emissions more than driving a hybrid car, buying green energy, or eating vegan food. To achieve this, I have limited my attendance at international conferences and switched to digital collaboration. My sustainable behavior has the added benefits of increasing my research productivity and allowing me to spend more time with my family.

Wadim Strielkowski

Centre for Energy Studies, Cambridge Institute
for Advanced Studies, Cambridge CB11AH, UK.
Email: strielkowski@cantab.net

Waste management

As a wastewater engineer who regularly hears about the sewer backups and treatment plant struggles, I have been more conscientious about my grease waste. I collect grease in a bin and bring it to a local restaurant with a dumpster dedicated to grease.

Juliet Tegan Johnston

Department of Civil, Environmental, and Geo-
Engineering, University of Minnesota, Minneapolis,
MN 55455, USA. Twitter: @queermsfrizzle

In poor rural areas of India with little access to food or clean water, women often feed their families first and only eat if there is food left over. Learning about this motivated me to minimize food waste. Now, if food from departmental parties is not eaten, we donate it to organizations that provide food to pregnant women. I

also gradually convinced my neighborhood to donate food to the needy.

Vandana Sharma

Department of Hematology, All India Institute
of Medical Sciences, New Delhi 110029, India.
Email: sharmavandana.phd@gmail.com

I grew up surrounded by forests. However, as the population increased, trees were cut down and used as firewood and fencing. Forty years later, the area is full of gullies. Seeing erosion firsthand inspired me to reduce demand for trees by not printing material that I can read on a screen instead.

Collet Dandara

Department of Pathology, Division of Human
Genetics, University of Cape Town, Cape Town,
Western Cape 7925, South Africa.
Twitter: @collet_dandara

The organization of lab protocols, waste management, biosafety, and security in a virology lab has given me skills that I've transferred to protect my wider environment. When throwing away everyday items such as medications or household chemicals, I take appropriate biosafety measures to minimize environmental risk.

Mahmoud M. Shehata

Center of Scientific Excellence for Influenza
Viruses, National Research Centre, Cairo 12622,
Egypt. Email: shehata_mmm@hotmail.com

Outreach and role modeling

Statistics inspired me to change my behavior. Outliers can drastically change statistical results. As a scientist, I can be the outlier that changes outcomes by raising awareness. To achieve this, I have tried to do more volunteer and extension work to reach the nonscientific public and raise awareness about actions that benefit animals and the environment.

Michelle Micarelli Struett

Department of Zoology, Federal University
of Paraná, Curitiba, Paraná 81531-980, Brazil.
LinkedIn: michelle-struett-2a1530b3

Geoscientists urge the rest of the world to limit CO₂ emissions, but the scientific community's frequent travels are seen as hypocritical. To address this, I helped start an organization of international researchers that has created a network of scientists and schools. When a researcher travels to a conference, we match him or her with a nearby school that would welcome a free lecture on a scientific topic. We use the necessary travel to maximize societal gain by teaching kids and empowering them to do science.

Athanasia Nikolaou

German Aerospace Center (DLR), Institute
of Planetary Research, 12489 Berlin, Germany.
Twitter: @NetworkScied

Once I realized that all sciences aim to describe and predict the movement and change of matter (and flow of energy), it was impossible not to see the world as an interconnected system. That means that sustainability problems are systems problems. Society needs scientists to live in a more sustainable way, but we need nonscientists even more. We need leaders in industry and government to change the systems by using evidence-based reasoning to devise smarter processes and policies. To address this, I started teaching nonscientists to encourage systemic changes.

David W. Szymanski

Department of Natural and Applied Sciences,
Bentley University, Waltham, MA 02452, USA.
Email: dszymanski@bentley.edu

Science diplomacy uses scientific partnerships among nations to solve common problems. As a researcher in a war-torn country, I strive to translate this concept into reality by making changes at the national level through international scientific collaborations. My research on infectious diseases necessitates cross-boundary efforts. Through building effective collaborations, I have implemented several projects funded by international organizations to ease the suffering of underserved communities trapped by conflict and war.

Rashad Abdul-Ghani

Faculty of Medicine and Health Sciences, Sana'a
University, Sana'a, Yemen.
Email: rashadbq@yahoo.com

I was inspired by the epigenetics idea that a phenotype shaped by the environment is heritable without genetic change. Recent findings show that acquired characteristics (such as eating habits) shaped by the external environment can be inherited by the next generation without changes to genes. This means that if I establish a low-carbon lifestyle and healthy eating habits, the next generation can inherit these behaviors, which are beneficial to them as well as to the environment.

Bo Cao

Core Research Laboratory, The Second
Affiliated Hospital, School of Medicine, Xi'an
Jiaotong University, Xi'an, Shaanxi 710004, China.
Email: bocao@vip.qq.com

Diet choices

A recent study estimated that we can reduce greenhouse gas emissions by 30% simply by changing our habits from a meat-based to a plant-based diet. After reading the paper, I stopped eating all kinds of meat. I hope to not only reduce my personal impacts on nature but also



TOMORROW'S EARTH

Read more articles online
at scim.ag/TomorrowsEarth

influence other people to adopt more sustainable consumption habits.

Luiz H. Varzinczak

Department of Zoology, Ecology, and Conservation Graduate Program, Federal University of Paraná, Curitiba, Paraná, 81530-000, Brazil. Email: luiz.varzinczak@gmail.com

On average, cows eat 6 pounds to gain 1 pound. The same ratio is approximately 2 for chickens and 1.5 for fish. In other words, eating a given amount of beef takes a bigger toll on the environment than eating the same amount of chicken or fish. For this reason, I choose fish, chicken, and vegetables over red meat. Overcoming my preference for the taste of red meat required both creativity in the kitchen and constant reminders that my choices are healthier than the alternatives, for both me and the environment. It also helps to remind myself that, as a scientist, I follow the data over my personal preferences.

Bilal Ersen Kerman

Regenerative and Restorative Medicine Research Center, Istanbul Medipol University, Istanbul 34810, Turkey. Email: bkerman@gmail.com

Purchasing habits

Because tap water is not potable in Ghana, plastic sachet bags that hold drinking water have become ubiquitous. Once empty, the bags are often thrown into the streets, and countless reports show the danger they pose to the environment. I have therefore set up a water filtration system at home to produce drinking water and reduce plastic waste.

Patrick Kobina Arthur

Department of Biochemistry, Cell, and Molecular Biology, University of Ghana, Legon-Accra, GAR LG54, Ghana. Twitter: @PAKARErst

Delay discounting—the concept that an individual will forgo a higher reward later for a smaller reward earlier—explains many unhealthy behaviors. Understanding how the environment influences our behaviors is a good step to make healthier choices. This concept helps me to make more sustainable purchasing decisions. Once I learned the power of marketing, such as sales items framed in a way to induce excessive consumption, I found ways to improve my self-control.

Fernanda Suemi Oda

University of Houston—Clear Lake, Houston, TX 77058, USA. Email: fsuemioda@gmail.com

I was shocked and saddened to see pictures of the amount of plastic in the oceans and to read the scientific studies of all the ways plastic and other types of pollution are harming ocean life and damaging ecosystems. To do my part, I've been making an effort to carry reusable bags and water bottles so that I don't need to waste plastic. I also go out of my way to purchase items that don't use plastic wrapping or packaging. I hope to reduce my family's plastic footprint and to serve as an example for others.

Wendy Bohon

IRIS, Washington, DC 20005, USA. Twitter: @DrWendyRocks

The One Health concept unifies environmental, animal, and human health. Humans and other animals live in a shared environment. This concept makes clear that my behavior deeply affects the health of animals and the environment. When I recognized this, I increased

my food purchases at local food fairs to reduce the fuel spent on transporting the food I consume.

Joel Henrique Ellwanger

Department of Genetics, Universidade Federal do Rio Grande do Sul, Porto Alegre, Rio Grande do Sul, 91501-970, Brazil. Email: joel.ellwanger@gmail.com

Pollution is affecting our air and water, especially in developing countries, which is exacerbating problems caused by climate change. In response, I stopped buying clothes from “fast fashion” companies that pollute the environments where their factories are located. When I need new clothes, I buy from ethical, sustainable companies or I shop at local consignment shops.

Sam Tyner

CSAFE, Iowa State University, Ames, IA 50011, USA. Twitter: @sctyner

Political action

I take public transportation, limit flying, and buy organic, plant-based food. However, no individual actions will stop the current system from continuing as it is. Real change will require the disruption and ultimate destruction of the fossil fuel industry. Marches such as Greta Thunberg's School Strike for Climate and the Extinction Rebellion in London, which block freeways and runways, are a good start. Only a cultural revolution has any chance of leading to a sustainable, or even just tolerably habitable, world.

E. Joseph Jordan

Department of Biochemistry & Biophysics, Stockholm University, Stockholm, Sweden. Email: e.jordan12@gmail.com

There are a lot of actions people can take to reduce their greenhouse gas emissions. However, it is incredibly unlikely that individuals can reduce emissions enough to prevent the worst effects of climate change. That will require collective action through governments and public policy. Therefore, I vote only for federal, state, and local candidates with strong, transparent climate policies. Without effective policies, individuals' efforts to reduce emissions can be completely undone by those who prioritize profit or short-term expediency. Governments won't change until people win or lose elections based on climate policies. It's up to us to make that happen.

Colin Murphy

Policy Institute for Energy, Environment, and the Economy, University of California, Davis, CA 95616, USA. Twitter: @scianalysis



In Ghana, potable water is sold in single-use sachet bags, leading to plastic waste and pollution.

NextGen Voices: Science-inspired sustainable behavior

Brijesh Kumar, Mark Martin Jensen, Wadim Strielkowski, Juliet Tegan Johnston, Vandana Sharma, Collet Dandara, Mahmoud M. Shehata, Michelle Micarelli Struett, Athanasia Nikolaou, David W. Szymanski, Rashad Abdul-Ghani, Bo Cao, Luiz H. Varzinczak, Bilal Ersen Kerman, Patrick Kobina Arthur, Fernanda Suemi Oda, Wendy Bohon, Joel Henrique Ellwanger, Sam Tyner, E. Joseph Jordan and Colin Murphy

Science **364** (6443), 822-824.
DOI: 10.1126/science.aax8945

ARTICLE TOOLS

<http://science.sciencemag.org/content/364/6443/822>

RELATED CONTENT

<http://science.sciencemag.org/content/sci/364/6443/807.full>
<http://science.sciencemag.org/content/sci/364/6443/829.full>
<http://science.sciencemag.org/content/sci/364/6443/836.full>
[file:/content](#)

PERMISSIONS

<http://www.sciencemag.org/help/reprints-and-permissions>

Use of this article is subject to the [Terms of Service](#)

Science (print ISSN 0036-8075; online ISSN 1095-9203) is published by the American Association for the Advancement of Science, 1200 New York Avenue NW, Washington, DC 20005. 2017 © The Authors, some rights reserved; exclusive licensee American Association for the Advancement of Science. No claim to original U.S. Government Works. The title *Science* is a registered trademark of AAAS.